Plant Odors.

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In furnishing descriptions of plants to aid the learner in identifying them, the odor is an important element, but we often find it neglected. The cause of this neglect is manifold; the poverty of our language in affording names to distinctions of odor, and the difficulty of determining what are the elementary odors, contributing to it, among other sources of embarrassment. The writer's object is to offer a theory by which elementary odors may be detected in their almost innumerable compounds in a way which will lead to the formation of a systematic nomenclature.

His theory is this: that, owing to the sympathetic connection of the olfactory nerve with the nerves controlling the organs of secretion and excretion, each elementary odor produces a specific effect on some one of these organs and may be recognized by this effect.

Thus, it is not only true that the alliaceous odor stimulates the lachrymal glands, producing in sensitive persons an actual flow of tears, but conversely, if we find any odor that so stimulates the lachrymal glands it is a proof that it contains the alliaceous element.

It may be said that the odor of wood-smoke excites the lachrymals, although it is not alliaceous; but it is not the odor of the smoke; it is the impact of particles of the smoke upon the eyeball that does it. Protect the eyes effectually against the smoke and no such effect will be perceived from the mere odor.

Again, it may be said that the lachrymals may be excited by any odor that brings pathetic incidents to mind. The odor of sweet basil, for instance, recalling the affecting tale of "a pot of sweet basil," may make some sentimental young lady weep. But we are not concerned with the effects of association, where the nervous system is reached through the mind, but speak only of the direct, physical effect of odors. No one ever attributed pathos to an onion.

For another example, the odor which excites the salivary glands is the parsley odor, an element common to the whole order Umbelliferæ. It may be said that anything good to eat will excite the salivary glands; that a hungry man's are ex-

cited by the smell of roast beef and a child's by the mere sight of candy. But that is because the man wants to eat the beef, and the child to eat the candy. Now, when the smell of parsley excites the salivary glands, one does not necessarily want to eat the parsley.

There are other appetizing odors, for instance, that of oak sap, which hangs around a saw-mill, but it does not excite the saliva. It stirs some of the deeper digestive fluids, probably the gastric juice.

Opposed to this last is the nauseating odor which belongs to the order Solanaceæ. Lifting up tomato vines on a dewy summer morning one will get the full benefit of it. It will enable us to understand the difficulty found in introducing the use of the potato as an article of diet into Europe, and to appreciate the fallibility of the human nose as a guide to wholesome food.

As there are many organs concerned in the functions of alimentation, so there may be as many different appetizing odors. It is not always easy to decide on the organ acted upon by each odor. The perfume of spice, for instance, the element common to nutmeg, allspice, mace and cloves, is appetizing, but whether through the stimulus it gives to the liver, the pancreas, or the intestinal juices, it would be rash for me to say. Combined with a weedy element in Lindera Benzoin, it still retains its appetizing quality ; but we do not so readily recognize it as appetizing when in combination with the delicious but cloying fragrance of the pink, sweet-william and carnation. Sweet odors are destructive of appetite, though they are not nauseating. They must, therefore, have an effect the reverse of stimulating on the hypogastric fluids.

The well-known odor of turpentine, found in various combinations among the Coniferæ, and in the genus Silphium, acts as an irritant upon the kidneys, as every one confined to the atmosphere of a paint-shop will corroborate.

The odor of musk, represented in the vegetable world by Mimulus moschatus and some other species of the same genus, is a notorious aphrodisiac ; while an element in the fragrance of camphor, frankincense and cedarwood has the opposite effect. Scarcely anybody will acknowledge that he likes the smell of musk, but nevertheless the perfumers regard it as a principal source of profit.

There is a delightful fragrance belonging to flowers of widely different species which agree in having a waxy texture, a white color, and a disposition to open, or to keep

open, during the night. Such is the perfume of the tuberose, jessamine, white lily (L. candidum), night-blooming cereus and many others. Delightful as it is, its physiological effect is undesirable. It enervates the system, and sometimes even causes headache. Opposed to this is the bracing odor of the hop, found also in hemp, although in a less pleasant combination. The hop aroma restores the balance of the nervous system, allays headache, and promotes a healthy, refreshing sleep. The absinthine odor of wormwood, chamomile, chrysanthemum and many other plants stimulates the skin to healthy action, relieves fever and promotes perspiration.

And now, to test the practical value of the theory, take a plant, hitherto unknown, with a labiate corolla and didynamous stamens. Its appearance indicates that it may belong to one of several orders, Scrophulariaceæ, Acanthaceæ, Verbenaceæ, or Labiatæ. The first impulse is to smell it, and the presence of a peculiar element in the odor will determine the search for it among the Labiatæ. Do the Labiatæ all smell alike, then? Far from it, for an educated nose would never mistake peppermint for spearmint, much less for thyme, sage, catnip or lavender. Then, are the other orders mentioned devoid of odorous species? Linaria is decidedly odorous, though by no means fragrant; Veronica, in some of its species, has a faint but agreeable smell, and Lippia citriodora a delightful fragrance. What common element is there, then, in the various odors of the Labiatæ by which the species of that order may be generally identified? The epithet "aromatic," applied to them, will not help us, for the same epithet is applied to absinthine, spicy, balsamic, lupuline and many other distinct odors. We must recognize it by a peculiar physiological effect produced by it. On some sultry August day, one is walking, tired, thirsty and faint, when the foot accidentally strikes a patch of mint, and the atmosphere is filled with the perfume. It will be agreed that a refreshing sensation is the immediate result. How the sensation is produced I do not pretend to say; but am inclined to describe it as a cooling of the mucous membrane lining the nose, pharynx and mouth. This peculiar sensation is the effect of an odor common to all the Labiatæ. I have noticed it in Monarda fistulosa, a plant with a smell distinct from that of mint, owing to the presence of a citric element which mint lacks. I have detected it beneath the honeyed sweetness of thyme and lavender, as well as under the absinthine element in sage, and the scarcely agreeable geranium element in ground ivy. In some of the

Labiatæ, Teucrium for instance, it is scarcely perceptible, but there are exceptional cases.

I would like to show that the characteristic element in the Cruciferæ has an opposite or thirst-exciting effect, and to point out the effects of citric, amygdaline, malic, nutty and other odors, but enough has been said to illustrate my meaning.

BRIEFER ARTICLES.

A Study of Silphium perfoliatum and Dipsacus laciniatus in regard to insects.[1]—The upper surface of the leaf of Silphium perfoliatum near the axis is thickly set with small hairs. Their length is on the average about .17 mm. They are composed of four cells each having a distinct nucleus; the upper one is somewhat enlarged. Some of the hairs are colorless, while in some a peculiar brown substance was seen which was variously distributed, sometimes in masses at the top of the upper cell or diffused through the upper cell, and sometimes through the lower ones as well. These hairs point toward the tip of the leaf. Similar hairs were found all along the mid vein, side veins and veinlets of the upper surface of the leaf, and also on similar portions of the under surface. No difference was seen between these hairs and those near the axis, except that they were much more thickly set along a surface about an inch in length at the base of the leaf. The leaf examined was about 20 cm. long and was typical.

The brown material does not seem peculiar to the hairs. Upon the upper surface of the leaves were found some more very small prickles composed of two cells, the upper very pointed, the lower one globular and containing an onion-shaped mass of brown matter similar in appearance to that in the hairs. In the epidermal cells of the stalk were found similar masses, and some cells were completely filled with it.

The cavities formed by the perfoliate leaves are very small and hold but a few cubic centimeters of water. They are full after any rain or heavy dew, but are often dry before noon. If cups are dry at night they will be filled in the morning when there is a heavy dew; otherwise they will be dry.

These cups do not appear to serve any purpose as insect catchers. No insects were seen in any of the cups. This plant is not native here,[2] and perhaps it does not show its full development with us.

Is Dipsacus laciniatus insectivorous? To answer this question was the purpose of the following observations:

It is well known the connate leaves of this plant form cups sur-

[1] Read at meeting of A. A. A. S., New York, August, 1887.

[2] Lansing, Michigan.